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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,303	01/02/2004	Kay Y. Blohowiak	BO1 - 0185US	8803

60483 7590 03/25/2008

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SELLMAN, CACHET I	
ART UNIT	**PAPER NUMBER**
1792	

MAIL DATE	DELIVERY MODE
03/25/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/751,303	BLOHOWIAK ET AL.	
	Examiner	Art Unit	
	CACHET I. SELLMAN	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *4-13,16-21,23,24,42-45 and 47-71* is/are pending in the application.

4a) Of the above claim(s) *47-60* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *4-13,16-21,23-24, 37-40,42-45, and 61-71* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Acknowledgement is made of the amendment filed by the applicant on 11/21/2007, in which claims 4, 16, 24, 43, and 45 were amended and claim 71 was added. Claims 4-13, 16-21, 23-34, 37-40, 42-45, and 47-71 are currently pending in U.S. Application Serial No. 10/751,303.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 4-13 and 71 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In independent claim 4, the applicant is claiming a second curative material which comprises "chromium octotate, and at least one of 4, 4'-diaminodiphenylsulfone, and 3,3' - diaminodiphenylsulfone." In the specification (page 5), the applicant states the use of a second curative material "suitably includes about 0% to about 100% by weight of 4,4'-diaminodiphenylsulfone, about 0% to about 100% by weight 3,3'-diaminodiphenylsulfone, and about 0% to about 0.2% by weight of chromium octotate" which range is much narrower than that of the claimed range. The claim requires the use of the chromium octotate, however, in the specification the range of use is 0-0.2% as well as the claim requires that either/or of the

diaminodipheylsulfones are used but the specification shows the use of both. Due to the broad language in the specification, it would take one having ordinary skill undue experimentation to use the combination as stated in the claim especially without any examples or further explanation of how to determine the percentages of each component being used.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 4-6, 10-11, 16-17, and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 5807430) in view of Shimizu et al. (US 4374890), Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman (US 4269759).

Zheng et al. discloses a process for treating metal surfaces with a composition to prepare the metal for subsequent bonding. The process comprises the steps of cleaming the metal surface by using a caustic solution of sodium hydroxide (see col. 7,

line 15-17); followed by immersion in tap water to rinse the metal surface (see col. 7, lines 18-19); a sol-gel is applied to the metal material (see col. abstract); evaporating the water portion of the sol-gel (see col. 7, lines 49-53) and followed by applying an epoxy adhesive (see col. 8, lines 35-42).

Zheng et al. teaches that a primer is optional in order to reduce chemical activity of the adherent coatings which can absorb contaminants. Since Zheng et al. teaches the optional use of the primer, it is within the scope of Zheng et al. to apply the adhesive directly to the sol-gel coating especially if the chemical activity is at an optimal level to where the contaminants will not absorb.

Zheng et al. does not teach an epoxy based adhesive having the composition as listed in claims 4 and 16. However, Zheng et al. teaches the use of common epoxy adhesives such as EA-9649 which according to WO/1994/026994 consists of epoxy resin of trifunctional aromatic glycidyl ether and epoxidized novolac and a curative of 4,4'-diaminodiphenyl sulfone. This adhesive lacks the carboxy-terminated acrylonitrile butadiene rubber as required by claim 4.

Shimizu et al. teaches the application of an adhesive to a metal plate where the adhesive comprises a first epoxy composition and a second composition then the composition is cured by heating the modulus elasticity in tension sufficient to increase the stiffness of the metal (abstract). Shimizu et al. teaches that the epoxy resins can be glycidyl ether type and can be used alone or in combination with each other depending on the desired physical properties of the epoxy resin composition. The resin includes hardeners that are used to exhibit curing action upon heating such as 4,4'-

diaminodiphenylsulfone in amounts between 1-15% by weight of the total epoxy resin (column 3, lines 32-50). Shimizu et al. teaches that various additives can be used such as high molecular weight epoxy resins derived form bisphenol A and butadiene acrylonitrile copolymers in the amount of 5-100 % by weight which increases the formability of the adhesive (column 3, lines 57-64). Shimizu et al. teaches the use of 35 parts of bisphenol A type liquid epoxy resin with 50 parts bisphenol a type solid epoxy resin (column 5, lines 63-66). Shimizu et al. also teaches the use of 10 % of carboxyl group containing nitrile rubber (column 6, lines 37-40). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the epoxy material of Shimizu et al. using the amounts of the claim through routine experimentation especially absent any criticality in using the claimed range. One would have been motivated to do so because Shimizu et al. teaches that the amount and components of the mixture affects the overall cohesive force, sag, viscosity, and wetting properties of the resin (column 3, lines 51-56) therefore one would have a reasonable expectation of success in applying the adhesive to the metal substrate.

Dow Product Information states that novolac resin has higher functionality than standard bispheol A based epoxy resins and have good thermal stability, mechanical strength and resistance against chemicals. The novolac resin produces a more tightly cross-linked cured system than bisphenol-A based liquid epoxy resins.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the adhesive of Shimizu et al. and use the novolac resin in Dow Product Information. One would have been motivated to do so

because both discloses resins that can be used in adhesives and Dow Product Information further teaches the advantages of improved temperature performance, mechanical strength and resistance to various chemicals when using novolac over epoxies formed from bisphenol A.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Zheng et al. to include applying the epoxy mixture of Shimizu et al. and Dow Product Information. One would have been motivated to do so because both disclose applying epoxy adhesive to a metal substrate and Shimizu et al. further teaches that the adhesive does not have the problem of forming strain or depression in the metal therefore one would have a reasonable expectation of success in applying the epoxy resin.

The Shimizu et al. adhesive uses 4,4'diaminodiphenylsulfone and does not teach the use of chromium octoate as required by claim 4, however, it was well known in the art at the time the invention was made to use a esterification catalyst when using the diaminodiphenylsulfone with a butadiene rubber in order prevent the promotion of epoxy homopolymerization as taught by Edelman. Edelman teaches the use of chromium octoate as the catalyst (see abstract, col. 11, lines 11-26 and col. 12,l ines 26-64). It would have been obvious to one having ordinary skill to modify the adhesive to use the chromium octoate to prevent epoxy homopolymerization.

The metal surface can be aluminum, titanium, and steel (see col. 4,lines 1-6 of Zheng et al.) as required by **claim 5 and 17**. The caustic concentration used is 10% (see col. 7, lines 15-17) as required by **claim 6.** Zheng et al. teaches the that the

coating is applied at a thickness of about 0.05-5 microns, and more typically form 0.1-1 micron (50-5000nm or 100-1000nm) see col. 7,l ines 57-61 which overlaps the claimed range. See *In re Wertheim*, 541 F.2d 257, 191
USPQ 90 (CCPA 1976) as required by **claims 10 and 11**.
Edelman teaches the use of 0.01-0.1 % of chromium octoate (see col. 11, line 24) as required by **claim 71**.

6. Claims 7-9 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. in view of Shimizu et al., Dow Product information and Edelman as applied to claims 4 and 16 above in further view of Blohowiak et al. (US 5869141).

Zheng et al. teaches that the sol-gel is comprised of a metal alkoxide; water, an organoalkosysilane comprising silane coupling groups capable of bonding with the material to be bonded with the metal surface and an acid which promotes hydrolysis and crosslinking of the metal alkoxide and organoalkosysilane (see abstract). The metal alkoxides can be made of silicon, aluminum, titanium, zirconium, tantalum, and hafium dependent on the type of substrate being used (see col. 4, lines 49-65). Zheng et al. does not teach the use of the combination in claims 12-13. However, it was well known in the art to use of zirconium alkoxide, 3-gylcidoxy-propyltrimethoxysilane, and glacial acetic acid (see col. 3, lines 3-10). Blohowiak et al. also teaches that the sol gel mixture can be an organozirconium compound such as tetra n-propoxyzirconium (see col. 4, lines 28-35).

Blohowiak et al. states that the mixture can have surfactants or thixotropic agents in the solution to improve spray characteristics. The surfactants or thixotropic agents

help to provide a more uniform sprayed coating and impove the manufacturability of the process. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a surfactant in the mixtures. One would have been motivated to do so because Blohowiak et al. teaches using surfactants improves the spray characteristics of the solution; provides a more uniform spray coating; and improves the manufacturability of the process therefore one would have a reasonable expectation of success of applying the sol gel.

Blohowiak et al. teaches the use of a zirconium alkoxide it will produce a tight bond with oxygen which does not dissociate during operation. The higher the bond strength prevents dissolution of the oxide layer, so that the Zr component in the sol coating functions as an oxygen diffusion barrier as well as a good adhesion bond (see col. 2,lines 37-55) therefore it would have been obvious to one having ordinary skill in the art to use the Zr alkoxide in the process of Zheng et al. in order to produce an oxygen diffusion barrier as well as a strong adhesive bond.

Zheng et al. fails to teach the use of sodium hydroxide at 25% or at the temperatures of claim 7-9. However, Blohowiak et al. teaches cleaning the metal substrate using TURCO 5578 at a concentrate of 10%-30% at a temperature of 190 (+/-5) °F (see table 6, col. 20, line 45). Blohowiak et al. does not teach that the NaOH concentration in the caustic solution is 25% but the percentage is within the range of Blohowiak et al.. However, Blohowiak et al. teaches that the alkaline etch with TURCO 5578 (caustic solution with NaOH) produces a roughened surface better suited for adhesive bonding.The concentration of the alkaline solution will affect the roughening of

the surface making it a result effective variable. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process to include the concentration within the claimed range through routine experimentation in order to achieve the desired roughening of the metal surface especially absent any criticality in using the claimed range.

Blohowiak et al. teaches using such a alkaline cleaning solution results in a mat finish, and shows superior hot/wet durability (see col. 10, lines 19-21) therefore one would have been motivated to modify the process of Zheng et al. to use the alkaline wash of Blohowiak et al. in order to produce a surface having superior hot/wet durability.

7. Claims 18-19 and 61-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 5807430) in view of Shimizu et al. (US 4374890), Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman (US 4269759) as applied to claims 4 and 16 above, and in further view of Montano et al. (US 6616976).

The teachings of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman are as stated above. However, they fail to teach the method in which the adhesive is applied.

Montano et al. teaches a method for treating adhesion promoted metal surfaces with an epoxy resin. Montano et al. discloses a process of roughening a metal surface, applying an adhesion promotion composition to the metal surface then coating it with an epoxy resin composition (abstract). Montano et al. also teaches that the epoxy resin

composition is can be applied by spray coating, dip coating, roller coating, or any suitable method to apply an epoxy resin (column 9, lines 41-46).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman include applying the epoxy adhesive using the methods of Montano et al. One would have been motivated to do so because both disclose processes where a metal is coated with an adhesion promotion composition and then coated with an epoxy resin and Montano et al. further discloses an operable way of applying the epoxy resin coating therefore one would have a reasonable expectation of success in applying the adhesive coating to the metal.

8. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman as applied to claim 16 and in further view of Tola (US 5049232).

The teachings of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman as applied to claim 16 are as stated above. However, the references fail to teach applying the adhesive at the claimed thickness as required by claims 20-21.

Tola discloses a method for forming a foil/dielectric laminate by applying an epoxy resin to the foil, baking the adhesive in an oven to remove the solvent in the adhesive, which dries the adhesive and reduces the thickness of the layer to about 0.4 mils. The thickness is a result effective variable, which depends on the curing

conditions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the thickness within the claimed range through routine experimentation in order to ensure that the foil is laminated to the dielectric especially since there is no evidence in using the thickness in the claimed range.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman to include applying the adhesive at the thickness as taught by Tola. One would have been motivated to do so because both disclose applying an epoxy to a foil for form a laminate and Tola teaches a process where a laminate is formed using an epoxy applied to a foil therefore one would have a reasonable expectation of success in forming the laminate.

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman as applied to claim 16 and in further view of Poutasse et al. (US 5629098).

The teachings of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman as applied to claim 16 are as stated above. The references fail to teach using acetone as the solvent in the adhesive.

Poutasse et al. discloses applying an epoxy adhesive to foil to produce a laminate. Poutasse et al. teaches that the adhesive contains a solvent where the solvent can be acetone (column 4, lines 55-59).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman in view of Shimizu et al. to include the solvent of Poutasse et al. One would have been motivated to do because both disclose processes for applying an epoxy adhesive that contains an epoxy novolac, bisphenol epoxy resin to a foil to make a laminate where the foil is roughened before the adhesive is applied and Poutasse further teaches that the adhesive contains a solvent therefore one would have a reasonable expectation of success in forming the epoxy adhesive.

10. Claims 24-27 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US 2002/0192496) and Koneiczny (US 4374890).

Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), and Edelman teaches subjecting a metal material to a caustic solution of sodium hydroxide; rinsing the metal material with water to remove the caustic solution of sodium hydroxide; applying a sol-gel coating to the metal material; evaporating the water portion of the sol-gel; applying a liquid adhesive directly to the sol-gel coating on the metal material wherein the liquid adhesive coating is an epoxy based adhesive coating having an epoxy material comprising about 3-35% by wt. diglycidylether of bisphenol-A, about 35-60% by wt. diglycidylether of bisphenol-A, about 10-30% by wt.

novolac-epoxy, and about 5-18% by wt. carboxy terminated acrylonitrile-butadiene rubber; and a second curative material comprising about 0-100% by wt. 4,4' – diaminodiphenylsulfone, about 0-100% by wt. 3,3'diaminodiphenylsulf-one, and about 0-0.2% by wt. chromium octotate. (see above rejection for claim 4).

Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), and Edelman fails to teach grit blasting the metal material with a mixture of fine particles of aluminum oxide in air and water, wherein the grit has a mesh size of about 180-320 as required by claim 24.

Vaughan et al. discloses a process for cleaning titanium alloy to remove oxide coating. The process includes cleaning the alloy (column 2, lines 17-19) using grit blasting with 50 micron alumina, water rinsing, immersing in a solvent and water rinsing (column 4, lines 34-38).

Grylls et al. teaches a method for coating a turbine airfoil where the airfoil is grit blasted to improve the surface finish. The airfoil can be grit blasted using particles mixed with compressed air and water vapor [0020] where the particles are alumina [0022]. Grylls et al. teaches that pressures and sizes must be controlled to prevent chipping of the surface. The grit size can be smaller than 60 mesh and preferably smaller than 220 mesh [0022].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Zheng et al. in view of Shimizu et al.,

Dow Product Information (DEN 425 Epoxy Novolac Resin), and Edelman to include the grit removal process of Vaughan et al. and grit blasting using water, air and alumina as taught by Grylls et al. One would have been motivated to do so because all teach processes of cleaning a metal substrate using grit blasting, Vaughan et al. teaches that the grit can be removed by water rinsing as is later immersed in solvent which is a step in the process Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), and Edelman and Grylls et al. teaches that by blasting with water vapor, air, and alumina improves the surface finish of the metal as well as prevents chipping of the surface therefore one would have a reasonable expectation of success in cleaning the metal substrate.

Konieczny discloses that grit blasting is used in a variety of manufacturing processes. Aluminum oxide particles of a selected size are directed against a surface to be blasted by compresses air or water. The goal is to create a surface having a roughness within a certain range, which is achieved by varying the size of the alumina grit, and the air pressure (column 1, lines 16-24).

It would have been obvious to one having ordinary skill in the art to modify the process of Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), and Edelman in view of Grylls et al. and Vaughan et al. to include the mesh size of about 280. One would have been motivated to do so because Konieczny teaches that the mesh size is a result effective variable because it controls

the surface roughness. Therefore it would have been obvious to one having ordinary skill in the art at the time to use the mesh size within the claimed range through routine experimentation in order to obtain a desired surface finish especially absent any criticality in using the claimed range.

The metal surface can be aluminum, titanium, and steel (see col. 4,lines 1-6 of Zheng et al.) as required by **claim 25**. The caustic concentration used is 10% (see col. 7, lines 15-17) as required by **claim 27.** Zheng et al. teaches the that the coating is applied at a thickness of about 0.05-5 microns, and more typically form 0.1-1 micron (50-5000nm or 100-1000nm) see col. 7,l ines 57-61 which overlaps the claimed range. See *In re Wertheim*, 541 F.2d 257, 191
USPQ 90 (CCPA 1976) as required by **claims 31-32**.

11. Claims 28-30, 33-34 and 43-45 arerejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US 2002/0192496) and Koneiczny (US 4374890) as applied above in further view of Blohowiak et al.

The teachings of Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US 2002/0192496) and Koneiczny (US 4374890) are as stated above.

Zheng et al. teaches that the sol-gel is comprised of a metal alkoxide; water, an organoalkosysilane comprising silane coupling groups capable of bonding with the material to be bonded with the metal surface and an acid which promotes hydrolysis

and crosslinking of the metal alkoxide and organoalkosysilane (see abstract). The metal alkoxides can be made of silicon, aluminum, titanium, zirconium, tantalum, and hafium dependent on the type of substrate being used (see col. 4, lines 49-65). Zheng et al. does not teach the use of the combination in **claims 33-34 and 43**. However, it was well known in the art to use of zirconium alkoxide, 3-gylcidoxy-propyltrimethoxysilane, and glacial acetic acid (see col. 3, lines 3-10). Blohowiak et al. also teaches that the sol gel mixture can be an organozirconium compound such as tetra n-propoxyzirconium (see col. 4, lines 28-35).

Blohowiak et al. states that the mixture can have surfactants or thixotropic agents in the solution to improve spray characteristics. The surfactants or thixotropic agents help to provide a more uniform sprayed coating and impove the manufacturability of the process. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a surfactant in the mixtures. One would have been motivated to do so because Blohowiak et al. teaches using surfactants improves the spray characteristics of the solution; provides a more uniform spray coating; and improves the manufacturability of the process therefore one would have a reasonable expectation of success of applying the sol gel.

Blohowiak et al. teaches the use of a zirconium alkoxide it will produce a tight bond with oxygen which does not dissociate during operation. The higher the bond strength prevents dissolution of the oxide layer, so that the Zr component in the sol coating functions as an oxygen diffusion barrier as well as a good adhesion bond (see col. 2,lines 37-55) therefore it would have been obvious to one having ordinary skill in the art

to use the Zr alkoxide in the process of Zheng et al. in order to produce an oxygen diffusion barrier as well as a strong adhesive bond.

The metal surface can be aluminum, titanium, and steel (see col. 4,lines 1-6 of Zheng et al.) as required by **claim 44**.

Zheng et al. fails to teach the use of sodium hydroxide at 25% or at the temperatures of claim 7-9. However, Blohowiak et al. teaches cleaning the metal substrate using TURCO 5578 at a concentrate of 10%-30% at a temperature of 190 (+/-5) °F (see table 6, col. 20, line 45). Blohowiak et al. does not teach that the NaOH concentration in the caustic solution is 25% but the percentage is within the range of Blohowiak et al.. However, Blohowiak et al. teaches that the alkaline etch with TURCO 5578 (caustic solution with NaOH) produces a roughened surface better suited for adhesive bonding.The concentration of the alkaline solution will affect the roughening of the surface making it a result effective variable. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process to include the concentration within the claimed range through routine experimentation in order to achieve the desired roughening of the metal surface especially absent any criticality in using the claimed range.

Blohowiak et al. teaches using such a alkaline cleaning solution results in a mat finish, and shows superior hot/wet durability (see col. 10, lines 19-21) therefore one would have been motivated to modify the process of Zheng et al. to use the alkaline wash of Blohowiak et al. in order to produce a surface having superior hot/wet durability.

12. Claims 37-38, 63-64, and 67-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US 2002/0192496), Koneiczny (US 4374890) and Blohowiak et al. as applied above in further view of Montano et al. (US 6616976).

Montano et al. teaches a method for treating adhesion promoted metal surfaces with an epoxy resin. Montano et al. discloses a process of roughening a metal surface, applying an adhesion promotion composition to the metal surface then coating it with an epoxy resin composition (abstract). Montano et al. also teaches that the epoxy resin composition is can be applied by spray coating, dip coating, roller coating, or any suitable method to apply an epoxy resin (column 9, lines 41-46).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Zheng et al. in view of Shimizu et al. Dow Product Information (DEN 425 Epoxy Novolac Resin) and Edelman include applying the epoxy adhesive using the methods of Montano et al. One would have been motivated to do so because both disclose processes where a metal is coated with an adhesion promotion composition and then coated with an epoxy resin and Montano et al. further discloses an operable way of applying the epoxy resin coating therefore one would have a reasonable expectation of success in applying the adhesive coating to the metal.

13. Claims 39-40, 66 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US

2002/0192496), Koneiczny (US 4374890) and Blohowiak et al. as applied above in further view of Tola.

Tola discloses a method for forming a foil/dielectric laminate by applying an epoxy resin to the foil, baking the adhesive in an oven to remove the solvent in the adhesive, which dries the adhesive and reduces the thickness of the layer to about 0.4 mils. The thickness is a result effective variable, which depends on the curing conditions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the thickness within the claimed range through routine experimentation in order to ensure that the foil is laminated to the dielectric especially since there is no evidence in using the thickness in the claimed range.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US 2002/0192496), Koneiczny (US 4374890) and Blohowiak et al.. to include applying the adhesive at the thickness as taught by Tola. One would have been motivated to do so because both disclose applying an epoxy to a foil for form a laminate and Tola teaches a process where a laminate is formed using an epoxy applied to a foil therefore one would have a reasonable expectation of success in forming the laminate.

14. Claims 42, 65 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US

2002/0192496), Koneiczny (US 4374890) and Blohowiak et al. as applied above in further view of Poutasse et al.

Poutasse et al. discloses applying an epoxy adhesive to foil to produce a laminate. Poutasse et al. teaches that the adhesive contains a solvent where the solvent can be acetone (column 4, lines 55-59).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Zheng et al. in view of Shimizu et al., Dow Product Information (DEN 425 Epoxy Novolac Resin), Edelman, Vaughn (US 3967091) , Grylls (US 2002/0192496), Koneiczny (US 4374890) and Blohowiak et al. to include the solvent of Poutasse et al. One would have been motivated to do because both disclose processes for applying an epoxy adhesive that contains an epoxy novolac, bisphenol epoxy resin to a foil to make a laminate where the foil is roughened before the adhesive is applied and Poutasse further teaches that the adhesive contains a solvent therefore one would have a reasonable expectation of success in forming the epoxy adhesive.

Response to Arguments

15. Applicant's arguments with respect to claims 4, 16, 24, 43, and 45 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CACHET I. SELLMAN whose telephone number is (571)272-0691. The examiner can normally be reached on Monday through Friday, 7:00 - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner
Art Unit 1792

/C. I. S./
Examiner, Art Unit 1792

/William Phillip Fletcher III/
Primary Examiner